General Notes.

GEOLOGY AND PALEONTOLOGY.

Recent Volcanic Eruptions in California.—In a paper published in *The Independent*, Professor G. Frederick Wright makes the following remarks concerning recent volcanic eruptions in California:

"The absence in America of volcanic phenomena east of the Rocky Mountains is amply compensated for by their abundance west of them. Probably the largest lava fields in the world are situated in Idaho, Washington, Oregon, California and Nevada. In age these belong to the latest of the geological periods, being for the most part tertiary. For many reasons there is much interest in determining how near down to the present time these volcanic eruptions have continued.

"The traveler over the lava beds of the Pacific slope cannot fail to be impressed by the fresh appearance of the basalt which covers so large a part of the surface. Considerable areas can readily be found whose surface looks as fresh as that of the slag from the furnace of yesterday. Many reports have been set in circulation by travelers that some of the volcanic cones have been witnessed by them in active eruption. Thus the members of Astor's party who, in 1811, crossed the Teton Mountains just south of the Yellowstone Park, averred that they saw peaks to the north of them sending forth volcanic smoke and vapor. As they were men of large experience, some men of science have been inclined to give credence to their opinion, and are confirmed in this view by the fresh appearance of some of the craters in the vicinity of Mount Jefferson, on the shores of Henry's Lake; while the activity of the geysers in the Yellowstone Park is perhaps indicative of the continued activity of volcanic forces throughout that general region.

"But there are so many phenomena that may be mistaken for volcanic smoke and vapor when seen from a distance that it is safer not to credit such general statements. Clouds and drifting snow might easily deceive a distant observer. It is probably thus that the reports originated concerning the volcanic activity of Mount Hood during the middle of this century. Mount Hood is indeed a volcanic crater; but so far from being active it is now filled with snow. Mount Rainier, or Tacoma, presents, however, the double phenomena of blowing hot and cold at the same time. The upper 5,000 feet of its surface is almost a continuous sheet of ice, but through a small orifice in a portion of the crater which crowns the summit, volcanic steam contin-

ues to find vent, and furnishes heat for the unlucky explorer who is compelled to spend a night at that lofty elevation.

"The most definite account of what may be called an historically recent volcanic eruption of any considerable extent in the region referred to at the outset has just been published in a Bulletin of the United States Geological Survey, by Mr. J. S. Diller. The area described is in northern California, in the vicinity of Lassen Peak, about one hundred miles southeast of Mount Shasta. Lassen Peak is itself a vast volcanic cone, and the center of numerous others smaller in size and later in origin, but all of recent geological age. The Cinder Cone, which was the special subject of Mr. Diller's researches, is ten miles northeast of Lassen Peak, in the vicinity of Snag Lake. The general elevation is here a little over 6,000 feet above the sea, and his cone rises 640 feet above the lowest point of its base, having a diameter of 2,000 feet at the bottom, and 750 feet at the top, and is composed of cinders which readily yield and slide down under one's weight as he walks over them.

"This Cinder Cone belongs to the earliest part of the eruption, and, in Mr. Diller's opinion, cannot be much more than two hundred years old. At the same time with the explosive eruption that produced the Cinder Cone, an immense amount of volcanic sand was ejected and scattered about the base for a distance of eight miles in every direction. Near the base this is between six and seven feet in depth, and thins out gradually toward the margin. Some time subsequent to this explosive outburst there took place a quiet flow of basalt, which poured from the southeast side of the cone, and spread itself over the sand, covering an area about three miles long by a little over a mile in width. The edge of this flow everywhere presents a precipitous front about one hundred feet in height, and Snag Lake is formed by the dam which this basalt stream has extended across the valley into which it flowed.

"The data for determining the age of this eruption seem to be as conclusive as could be desired. Dead pine trees, with their roots in the original soil, can still be seen projecting above the volcanic sand of the first eruption, and in some instances they have been partially overwhelmed by the later eruption of basalt, and their decaying tops project from under it. But the living trees all grow upon the surface of volcanic sand, and near the base of the cone their roots are not long enough to reach the original soil. The age of the oldest of the trees found living does not exceed two hundred years, and that, doubtless, as Mr. Diller supposes, very closely marks the date of the earlier erup-

tion. Ordinarily, also, pine trees, overwhelmed as this original forest was, would not survive more than thirty years. In the conditions of this dry climate two hundred years is a long time for them to remain exposed to the air without complete decay.

"The demonstration of so much volcanic activity at so recent a date in California renders it altogether likely that other eruptions will occur in that region in process of time, and that others have occurred at no great distance in the past. Previous to the eruption of the year 79, there was no historic record that Vesuvius had been an active volcano, and at a later period—between the fourteenth and seventeenth centuries—more than three hundred years elapsed without any serious eruption. It will be a matter of surprise if the volcanic forces west of the Rocky Mountains do not yet assert themselves with greater or less vigor. These investigations of Mr. Diller, therefore, show the possibility of bringing down to a reasonably modern period the date of the remains of man which have been found under the lava in various places on the Pacific Coast.

"Even Table Mountain in California might seem to yield a modern chronology in view of one fact brought out by Mr. Diller. It has been supposed that all of the erosion of the deeper valleys about Table Mountain has been subsequent to the time when this lava stream filled up the old channel of the Stanislaus River. In the light of Mr. Diller's observations, however, it would seem possible to suppose that the Table Mountain lava flow did not always follow the lowest channels open to it, but that it may have built up for itself obstructions in front of which it might turn aside to occupy abandoned channels of the old river at a higher level. This, at any rate, was a theory which suggested itself to me a year ago, as I examined the country about ten miles above Sonora, where the Table Mountain stream of lava crosses to the left side of the present Stanislaus. That the theory suggested to my mind in reference to the Table Mountain flow might have been a fact would seem no more strange than the actual course of some of the streams of lava which Mr. Diller has traced from the Cinder Cone so carefully studied by him. He says: 'At first the main stream flowed to the southeast, but gradually turned around to the left, until its direction was slightly west of north, where, though having flowed a total distance of three miles, the cessation of its flow was not more than a mile and a half from the vent. This course was not determined by the original configuration of the land, but by the obstructions to the later streams furnished by the cooling of earlier streams.'

"In view of present activity in the discussions of the antiquity of man, I can but regard this publication of Mr. Diller as of the very highest importance as calculated to allay the fears of a certain portion of the Christian public, and to check the hasty inferences that some are likely to draw from the recent facts which have been so freely published concerning the relation of man to the lava beds of the Pacific Coast. The time has not yet come to give the full chronological significance to those facts."

Continental Problems.—The annual address of Mr. G. K. Gilbert, President of the Geological Society of America, consisted of a statement of six unsolved continental problems, with a discussion of each question in turn. (1) "How are Continents supported?" introduced the doctrine of Rigidity versus Isostasy, with the weight of evidence in favor of the latter doctrine. (2) "Does heat or composition determine the difference in density of the material of the earth's crust?" was discussed in connection with (3) "What caused the Continental Plateau?" in which the author spoke at length of the only hypothesis yet advanced, that of Mr. Dana, which deserves to be more fully compared with the body of modern data. (4) "Why do Continental Areas rise and fall?" is a problem for which no solution has been suggested. (5) "Are Continents Permanent?" may probably be answered in the affirmative, but the fact is not yet fully established. (6) "Do Continents Grow?" is still open to discussion, although the doctrine has been generally accepted. In the author's opinion, the greater part of the data from which continental growth has been inferred may be fictitious and misleading. (Bull. Geol. Soc. Am., Vol. IV, 1893.)

Mineral Resources of the United States for 1891.[1]—This volume is the eighth of a series begun in 1882. It deals with the mineral progress of the year 1891, and contains a complete statement of the mineral products of that year. The opening chapter is a summary of the quantity and value of the metallic and non-metallic products for 1891, and also contains tabular statements of the outputs from 1880 to 1891. Under the head of Iron Ores, a résumé of the progress in the manufacture of iron and steel in the United States for the past twenty years is given.

The names of the contributors of the various sections appear in connection with the subjects treated.

[1] Mineral Resources of the United States for the Calendar Year 1891. David S. Day, Chief of Division of Mining Statistics and Technology. Washington, 1893.

Note on an Upper Devonian Fish from Canada.—A collection of fishes made by Mr. Jex at Campbelltown and Scaumenac Bay, Canada, has been recently examined by Dr. R. H. Traquair. Among them is a fine series of *Phaneropleuron curtum* Whiteaves, which shows clearly that the short break in the dorsal fin, which Whiteaves figured, but thought might be an accidental or abnormal character, is a natural division, and that the dorsal fin is in two distinct portions. Dr. Traquair feels justified in erecting the Whiteaves species into a new genus characterized by its double dorsal fin, and proposes for it the name *Scaumenacia curta.* (Geol. Mag., June, 1893.)

The Diatomaceæ of the Triassic (?) sandstone of New Jersey.—When I first settled in Newark, New Jersey, twenty years ago, I went about looking at the red sandstone for Diatomaceæ in it; but did not find them. I found pieces of trunks of wood. I found carbonate, silicate and sulphide of copper and carbonate of lime and mica, and worm burrows and ripple marks but nothing else. No minute fossils like Diatomaceæ. I looked at the sandstone every now and then, reasoning that it was a fresh water sediment, most likely laid down in very shallow water, and must contain the remains of Diatomaceæ, if they existed then. I examined the sandstone at Glen Ridge, about two miles from the station at Bloomfield on the Montclair and Bloomfield branch railroad where the Glen Ridge quarry and mining company have a quarry and are mining for copper. I examined the white sandstone at Forest Hill on the Greenwood Lake railroad and the old Schuyler copper mines at Belleville. I visited the red sandstone in the cutting where the Greenwood Lake railroad came through at Arlington just above Newark on the Passaic river. The cut is deep and it shows the sandstone dipping to the northwest and also a fissure which parted the rock in a nearly north and south direction or parallel to their strike. It is about five feet wide and shows rounded pieces of trap. This strongly indicates that the trap is not far below and that heat partially metamorphosed the rocks. This is one of the few fissures in the Triassic. The shale shows worm burrows and ripple marks. This would seem to point to a later instrusion than the Triassic of the trap. I examined the shale with acids for Diatomaceæ but without success. At last in June of this year, 1893, I found a spot immediately on the Passaic river just south of the city of Passaic where L. H. Arden has a brick yard in operation. I found he mined the clay from which the brick was made close by, and I visited the clay pit and saw the clay in finely stratified layers about as thin as paper

and extending to about twelve feet upward from the rain water which had accumulated here, on the day I saw it. The clay was red or brown and rather poor and the layers looking like a heap of reddish paper with darker papers introduced every now and then. On the top of this was about two feet of red glacial gravel in the form of till and between the gravel and the clay was a pocket of yellow clay which evidently belonged to the glacial deposit which I have examined all over northern New Jersey and which forms the so-called Lacustrine, Sedimentary or Sub Peat deposits of Diatomaceæ which occur from Nova Scotia to Pennsylvania on the Atlantic coast of the United States. This stratified clay is Triassic and I examined it with considerable interest for it was formed in shallow fresh water, and contained Diatomaceæ, scarce it is true, but the first Diatomacæ geologically speaking that have been found anywhere on the globe if we except the Diatomaceæ of the Carboniferous Coal found by Count Castracane some years ago. But the coal in which he discovered Diatomaceæ is doubtfully carboniferous. Perhaps it may be Tertiary. The Diatomaceæ I found in the Triassic clay were *Gomphonema acuminatum* and *Brebissonia lanceolata* along with straight sponge spicules. The clay was Triassic beyond a doubt for it was under the glacial clay and glacial till. What it rested upon is doubtful, Triassic sandstone most likely, for Triassic sandstone covers this part of New Jersey and no other rock is seen. It is important to note the finding of Triassic Diatomaceæ at this time and perhaps they will be seen in quantity further on. The color of the Triassic sandstone due to red iron oxide is remarkable and deserves investigation. The same color is present in the Catskill sandstone and at first they could be classed as one, but of course the fossils are different, and are very scarce in the Triassic, and rather plenty in the Catskill. It can hardly come from the magnetite on the border of the sandstone, as I. C. Russell suggests, for that, although present in New Jersey, is not always present and cannot be the cause of the red color of the Catskill sandstone. Perhaps it is present as an iron silicate, for it is more difficult to dissolve by boiling in acids than simple iron oxide.

ARTHUR M. EDWARDS, M. D.

Do Glaciers Excavate?—The recent critical examination of Alpine and other mountain valleys by Professor T. G. Bonney, confirms the conclusion he reached in 1874, that these valleys appear to be much older than the ice age, and to have been but little modified during the period or maximum extension of the glaciers. Mr. Bonney asserts that the erosive power of glaciers is small—quite unequal to the

work which has been ascribed to it. In this connection the author considers the difficulties presented by certain Alpine lakes in attributing them to the erosive action of glaciers. The position of such lakes as Constance, Geneva, Como, etc., and the subaqueous contours of Como and Geneva militate against the glacial erosion theory. The hypothesis offered by Mr. Bonney as an explanation of these lake basins is that originally they were eroded by ordinary agencies, and that their beds have been subsequently affected by differential movements. He instances as an example bearing out his theory the Great Lakes of North America whose origin has been so ably demonstrated by Dr. J. W. Spencer. (Geog. Journ., June, 1893.)

Plistocene Deposits of Russia.—Mr. S. Nikitin has given a brief account of the Quaternary deposits of Russia in a pamphlet of thirty-four large octavo pages. It is, however, merely a summary of a more detailed report which he is soon to publish. The paper closes with the following statement of the principal theses:

1. "The sub-division of the stone age into paleolithic and neolithic epochs should be preserved for European Russia, because it here coincides with the geological divisions into Pleistocene and modern, which are, in their turn, based upon paleontological data.

2. "The study of the glacial deposits of Finland and of the western region furnishes no proof of the existence of two distinct glacial epochs and an inter-glacial epoch. All the facts can be explained by the phenomena of the oscillation of the glacier at the time of its gradual, but irregular, retreat.

3. "If, however, one accepts the Swedish and Prussian theory of the sub-division of the glacial period into two epochs and an interglacial epoch, the second glaciation cannot have extended beyond the western region, in a certain part (comparatively restricted) of the Baltic region of Finland and of the government of Olonetz.

4. "The other portion of Russia subjected to glaciation, has only one morainic stage, corresponding to the deposits of the first glacial epoch of the Swedes.

5. "At the epoch of the more extended glaciation, the major part of Russia presented the aspect of a desert of ice, similar to that of Greenland, carrying no moraine upon its surface, and presenting no elevation free from ice, where forest vegetation could be preserved.

6. "The time corresponding to the interglacial epoch and the second glaciation of the Swedes, was probably, for the greater part of Russia, the epoch of the formation of the ancient lake deposits, the loess, and

the upper terraces of the rivers, which constitute the principal repository for the bones of the mammoth and other extinct mammals, which abounded here while Scandinavia and Finland were still covered by the glacier.

7. "In accordance with the composition and genesis of her Quaternary deposits, European Russia may be divided into a series of typical regions which are very characteristic, although resting upon differences which are scarcely recognizable, but which illustrate none the less the life of the immense Russian plain during the Quaternary period, and the formation of her superficial deposits.

8. "In the second portion of the glacial epoch, or of the pleistocene, the mammoth and other large mammals inhabited southern and eastern Russia in great numbers. As the glacier retreated, these animals advanced toward the north and northwest; toward the close of the pleistocene they reached Finland for a short time, and then disappeared entirely throughout the whole extent of European Russia, but probably later in the northeastern part and in Siberia.

9. "Man lived contemporaneously with the mammoth during the second part of the glacial epoch along the limits of glaciation, possessing an industry well-advanced, making use of fire among other things, but producing implements solely of naked flint. As the glacier retired, man advanced toward the north and northwest; he arrived in Finland and the Baltic region after the close of glaciation and after the disappearance of the mammoth; but man himself possessed already the more advanced culture of the neolithic age, and besides implements of trimmed flint, he knew how to make implements in polished stone, pottery, etc.

10. "European Russia shows no traces of man in the first part of the Pleistocene, or of any more ancient man." (Am. Journ. Sci., June, 1893.)